Grade VII

Lesson : 7 Congruence of Triangle

Objective Type Questions

I. Multiple choice questions

1. Name of the angle included between the sides DE and EF of ΔDEF:

a) ∠DEF b)EFD C)EDF D) None of these

2. In SAS congruency :

a) Corresponding sides are equal b) Corresponding angles are equal

c) Two corresponding sides and angle included are equal d)None of these

3. The symbol of correspondence is :

a.= b) ↔ c. ≠ d. ≅

4. If Δ ABC ≅ PQR, then any ∠B correspond to :

a) ∠P b) ∠R c) ∠Q d. None of these

1. a	2. c	3. b	4. c

II. Multiple choice questions

1. Which one of the following is not a criterion for congruence of two triangles?

a) ASA b) SSA c) SAS d) SSS

2 If Δ ABC Δ DBC are on the same base BC, AB = DC and AC= DB, then which of the following gives a congruence relationship?

a) Δ ABC ≅ Δ DBC b) Δ ABC ≅ Δ CBD

c) Δ ABC ≅ Δ DCB d) Δ ABC ≅ Δ BCD

3. If for Δ ABC Δ DEF, the correspondence CAB ↔ EDF gives a congruence, then which of the following is not true?

a) AC= DE b) AB = EF c) ∠ A = ∠ D d) ∠C = ∠E

4. By which of the following criterion two triangles cannot be proved congruent?

a) AAA b) SSS c) SAS d) ASA

5. Two triangles are congruent, if two angles and the side included between them in one of the triangles are equal to the two angles and the side included between them of the other triangle. This is known as the.

a) RHS congruence criterion b) ASA congruence criterion

c) SAS congruence criterion d) AAA congruence criterion

1. b	2. c	3. b	4. a	5. b

III. Multiple choice questions

1. Number of elements of a triangle is.

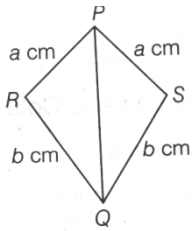
a) 6 b) 5 c) 4 d) 3

2. Two figures are said to be congruent , if they have exactly the same

a) area b) perimeter

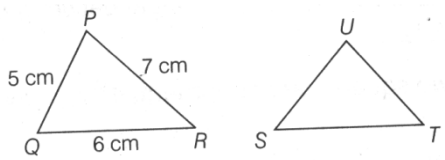
c) shape and size d) length and width

3. By which congruency criterion, the two triangles in the following figure are congruent?



a) RHS b) ASA c) SSS d) SAS

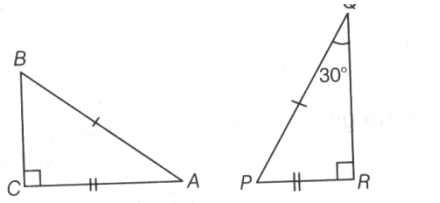
4. Δ PQR is congruent to Δ STU (in figure), then what is the length of TU?



a) 5 cm b) 6 cm

c) 7 cm d) Cannot be determined

5. If Δ ABC ≅ Δ PQR, then the value of ∠ A will be .



a) 25^0 b) 60^0 c) 55^0 d) 90^0

6. Which of the following rule of congruency say that Δ ABC ≅ Δ PQR (in the above Q.7)

a) SSS b) RHS c) ASA d) SAS

7. By applying ASA congruence rule, it is to be established that Δ ABC ≅ Δ QRP and it is given that BC = RP. What additional information is needed to establish the congruence?

a) AB = QR and ∠C = ∠P

b) ∠B = ∠R ∠A = ∠Q

c) ∠B= ∠R ∠C = ∠P

d) None of the above

8. Which congruence criterion do you use in the following ZX = RP, RQ=ZY, ∠ PRQ = ∠XYZ. So, ΔPQR ≅ ΔXYZ.

a) ASA rule b) SSS rule c) RHS rule d) SAS rule

1. a	2. c	3. b	4. c	5. a	6. b	7. b	8. b

Hints / Solutions

I. Fill in the Blanks

1. If two line segments have the _____length, then they are congruent.

If two line segments have the equal length, then they are congruent, because for congruency of two figures, we always have equal/ same shape and size.

2. Two triangles are said to be congruent, if pairs of corresponding side and the corresponding _____ are equal.

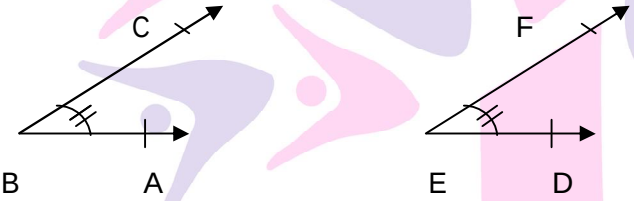
Two triangles are said to be congruent, if pairs of corresponding side and the corresponding angle are equal.

3. When the hypotenuse and one side of one right angled triangle are respectively equal to the hypotenuse and one side of the other right triangle, the triangles are congruent. This is called _____congruence of triangle.

When the hypotenuse and one side of one right angled triangle are respectively equal to the hypotenuse and one side of the other right triangle, the triangles are congruent. This is called RHS congruence of triangle.

4. Two angles are said to be congruent, if they have _____.

Two angles are said to be congruent, if they have equal measure.



Here ∠ ABC = ∠DEF; because their measures are same.

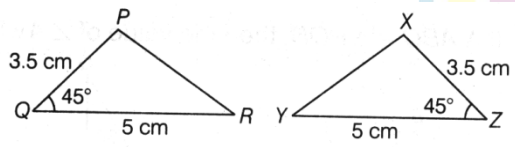
5. In ΔKMN, the included angle between MN and NK is _____ .

In ΔKMN, the included angle between MN and NK is ∠ **MNK.**

6. Two squares are congruent , if they have same _____.

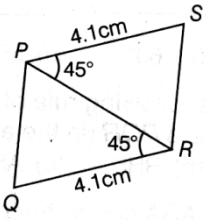
Two squares are congruent , if they have same length.

7. In the given figures , Δ PQR ≅ Δ _____.



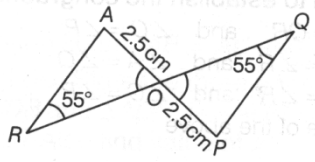
In the given figures , Δ PQR ≅ ΔXYZ

8. In the given figure, Δ PQR ≅ Δ _____.



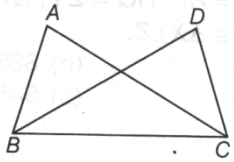
In the given figures , Δ PQR ≅ Δ RSP

9. In the given figure, Δ ARO ≅ Δ _____.



In the given figures , Δ ARO ≅ Δ PQO.

10. In the following figure, Δ _____ ≅ Δ BDC.



In the given figures , Δ CAB ≅ ΔBDC.

I. True or False

1. If two triangles are equal in area, then they will be congruent.

False, for congruent of a triangle, the triangle should have equal length, shape and size.

2. If the hypotenuse of a right angled triangle is equal to the hypotenuse of another right angled triangle, then the triangles are congruent.

False, because for congruence of two right angled triangle, there is need hypotenuse and one side of a right angled triangle is equal to the hypotenuse and one side of another right angled triangle.

3. If three angles of a triangle are equal to the corresponding angles of another triangle, then the triangles are congruent.

False, for congruence of triangle, we can follow SSS, ASA, SAS and RHS congruence criterion.

4. If two legs of a right angled triangle, are equal to two legs of another right angled triangle, then the right angled triangles are congruent.

True, if two legs of a right angled triangle, are equal to two legs of another right triangle, then the right angled triangles are congruent. This is based on RHS congruence criterion.

5. If two sides and one included angle of a triangle are equal to the two sides and one included angle of another triangle, then the two triangles are congruent.

True, if two sides and one angle of a triangle are equal to the two sides and one angle of another triangle, then the two triangles are congruent. i.e. this congruence criterion is called SAS congruent criterion.

6. If two triangles are congruent, then the corresponding angles are equal.

True, if two triangles are congruent, then the corresponding angles are equal.

7. If two angles and a included side of a triangle are equal to two angles and a included side of another triangle , then the triangles are congruent.

True, by ASA congruence criterion.

8. If hypotenuse and an acute angle of one right angled triangle are equal to the hypotenuse and an acute angle of another right angled triangle, then the triangles are congruent.

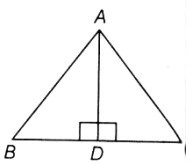
True, if hypotenuse and an acute angle of one right angled triangle are equal to the hypotenuse and an acute angle of another right angled triangle. Then, the triangles are congruent and this congruency rule is called RHS congruence criterion.

9. AAS congruence criterion is same as ASA congruence criterion.

False, only four congruence criterion apply for congruency.

10. In the adjoining figure, if AD $\perp$ BC and AD is the bisector of $\angle$ BA

Then, $\Delta ABD \cong \Delta$ ACD by RHS.



False, atleast hypotenuse of this triangle should be equal for RHS congruence criterion.

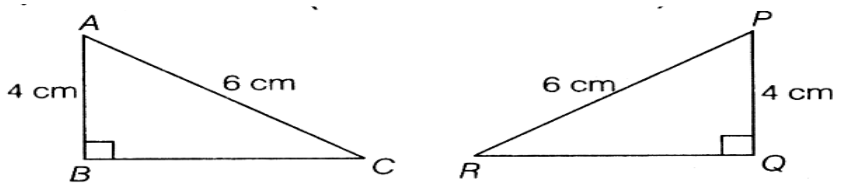
I. Match the following

Column I	Column II
a) Which rule will be applied, if two sides and one angle are equal	i) ASA rule
b) If all three sides are equal	ii) SAS rule
c) If two angles and one side are equal	iii) SSS rule
d) In two right angled triangles, hypotenuse and sides are equal	iv. RHS rule

a. ii	b. iii	c. i	d.iv

II. Match the following

2. On the basis of adjacent figures match Column A to Column B (if $\Delta ABC \cong \Delta PQR$).



Column A	Column B
(a) AB equal to	(i) PR
(b) AC equal to	(ii) $\angle Q$
(c) $\angle B$ equal to	(iii) PQ
(d) Congruence criterion will be	(iv) RHS

a. iii	b. i	c. ii	d. iv

I. Very Short Answer Questions

1. Write the pair of angles which are equal if Δ ABC = Δ PQR.

∠ A = ∠ P

∠ B = ∠ Q

∠ C = ∠ R

2. Write pair of sides which are equal if Δ ABC ≅ ΔXYZ

AB = XY

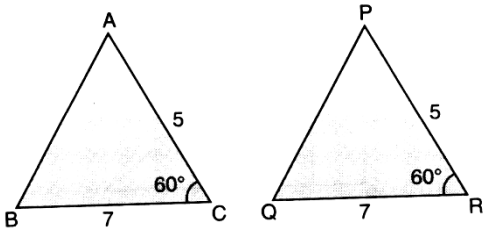
BC = YZ

CA = ZX.

3. When can we say that two squares are congruent?

When they have equal sides.

4. In the given figure which congruency criteria is used ?



SAS

II Very Short Answer Questions

1. What is RHS congruency?

RHS means Right angle Hypotenuse side congruency

2. Is AAS congruence criterion same as ASA criteria?

No, because in AAS criterion both angles are not lying over one side while in ASA both angles should lie over a line.

3. Which two circles are congruent?

Two circles are said to be congruent if the radii of both of circle are same.

4. If Δ ABC ≅ Δ PQR then what you can say about corresponding parts?

Δ ABC ≅ Δ PQR then corresponding parts should be equal hence

AB= PQ, BC = QR and SC=PR and

∠A = ∠P, ∠B= ∠Q and ∠C = ∠R

5. Which two things required to be congruent?

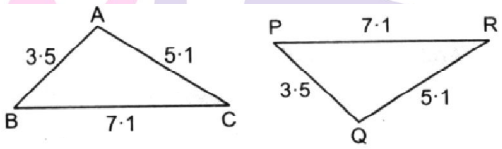
Two things required are same shape and same size.

I Short Answer Questions

1. In the given figure, two triangles Δ ABC and Δ PQR are given. Examine whether the triangles are congruent.

In the given triangles

Δ ABC and Δ PQR



AB = QP = 3.5

AC = QR = 5.1

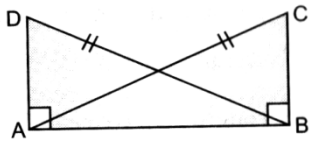
BC = PR = 7.1

So there exists S.S.S. congruency

Hence Δ ABC and Δ PQR

2. In the given figure DA ⊥ AB, CB ⊥ AB and AC =BD

State the these pairs of equal to Δ ABC and Δ BAD.



AC = BD

Hypotenuse [given)

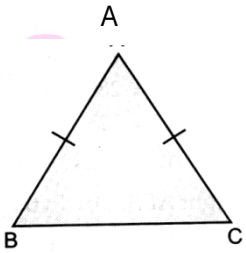
$\angle A = \angle B = 90$ [given)

AB = AB [COMMON SIDE)

II Short Answer Questions

1. In given figure ΔABC is an isosceles triangle with AB= AC

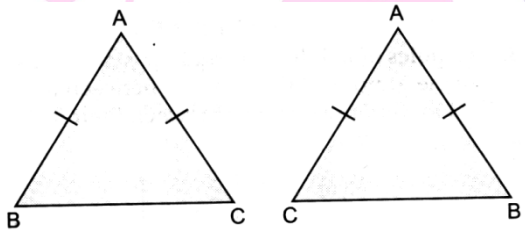
Take a trace copy of Δ ABC and also name it as Δ AC



a) State the three pairs of equal parts in ΔABC = Δ

b) In ΔABC = Δ ACB ? Why or Why not?

c) Is ∠ B = ∠C?



a) In the given triangles ΔABC and Δ ACB

AB = AC

AC = AB

∠ A = ∠ A

b) As all the three corresponding sides of ΔABC and Δ ACB are equal.

Hence, by S.S.S. congruency

ΔABC and Δ ACB

c) By C.P.C.T. ∠ B = ∠C.

2. In the given figure, ΔABC is an isosceles triangle in which AB = AC. If AB and AC are produced to D and E respectively such that BD = CE. Prove that BE = CD.

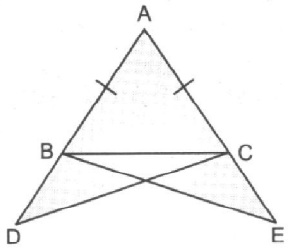
Since,

AB =Ac [given]

BD = CE [given]

∴ AB + BD = AC + CE [adding the two]

⇒ AD = AE



Now in ΔADC and Δ AEB

AD = AE. [proved above]

AC = AB [GIVEN]

∠A= ∠A (common)

So by S.A.S. congruency we have

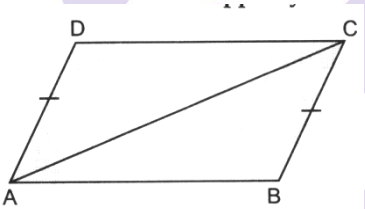
ΔADC and Δ AEB

⟹ C.P.C.T CD = BE.

3. In the given figure, AD = BC and AD ∥ BC. Is AB = DC? Give reasons to support your answer.

In the given figure, it is give that

AD = BC



And AD ∥ BC

Now in Δ ADC and Δ ABC

AD = BC

∠DAC = ∠ ACB

[As AD ∥ BC and AC is transversal

∠DAC = ∠ ACB are alternate angles]

AC = AC (common)

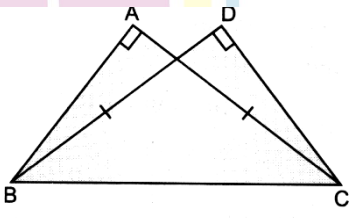
So by S.A.S. congruency we have

Δ ADC and Δ ABC

⟹ by C.P.C.T. AB =CD

4. In the given figure, triangles Δ ABC and Δ BCD are right angled at A and D respectively; Prove that Δ ABC and Δ DCB.

Is AB = DC ? give reason



In Δ ABC and Δ DCB,

AC=DB [GIVEN]

∠ BAC= ∠CDB = 90^0 [GIVEN]

⟹ by C.P.C.T. AB =DC.

III Short Answer Questions

1. If Δ DEF ≅ Δ BCA, write the part(s) of ΔBCA that correspond to

i) ∠E ii) $\overline{EF}$ iii) ∠ F iv) $\overline{DF}$

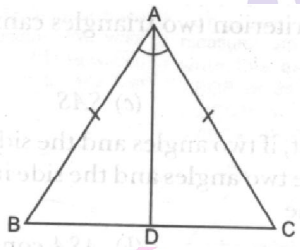
Δ DEF = ≅ Δ BCA

i) $\overline{\angle E}$ = ∠C

ii) $\overline{EF}$ = $\overline{CA}$ [∴ corresponding parts are equal]

iii) ∠ F = ∠A

iv) $\overline{DF}$ = $\overline{BA}$**2. In figure, AB = AC and AD is the bisector of ∠BAC.**



i. State three pairs of equal parts in triangles ADB and ADC.

ii. Is ∠B = ∠ *C*? Give reasons.

i. The three pairs of equal parts are as follows.

AB = AC (Given)

∠BAD = ∠CAD (AD bisects ∠BAC)

And AD = AD (Common)

ii. Yes, ΔADB ≅ Δ ADC (By SAS congruence rule)

iii. $\angle B = \angle C$ (Corresponding parts of congruent triangles)

3. In ΔABC, ∠A = 30^0, ∠B = 40^0 ∠C = 110^0

In Δ PQR, ∠P = 30^0, ∠Q = 40^0 ∠R = 110^0

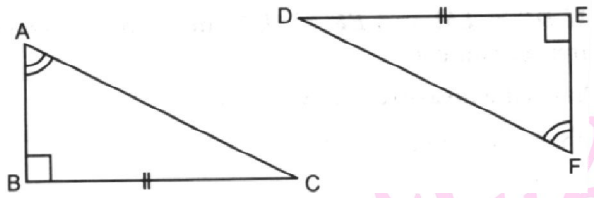
A student says that ΔABC ≅ Δ PQR by AAA congruence criterion. Is he justified? Why or why not?

No, it is not justified because.

i) there is no such condition for congruency and

ii) though angles are equal but there is no information about lines. For congruency the shape and size both must be similar of the two given figure.

4. Explain, why ΔABC ≅ ΔFED .



i) $\overline{BC} = \overline{ED}$ (Given)

ii) ∠B = ∠E (Both of 90^0)

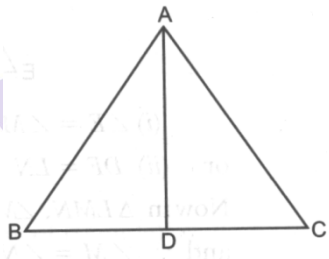
iii) ∠A = ∠F (Given)

∴ ΔABC ≅ ΔFED . (By AAS congruency)

5. Δ ABC is an isosceles triangle with AB =BC and D is the mid-point of base BC (Figure).

i. State three pairs of equal parts in the triangles ABD and ACD.

ii. Is ΔABD ≅ ΔACD? If so why?



i) In ΔABD and ΔACD

a) AB = AC (Given)

b) BD = CD (D is mid point of BC)

c) AD = AD (common)

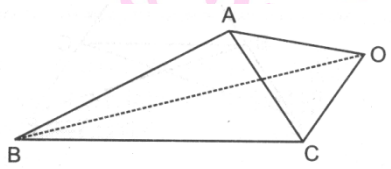
ii) Yes, Δ ABD ≅ ΔACD

By SSS Congruency.

I. Long Answer Questions

1. If O is a point in the exterior of Δ ABC. Show that :

2 (OA + OB + OC) > (AB + BC + CA).



In Δ AOB

OA + OB > AB _____(i)

Similarly, in Δ BOC,

OB + OC > BC _____(2)

and in ΔAOC

OA + OC > AC _____(3)

By adding (i) , (ii), and (iii), we get

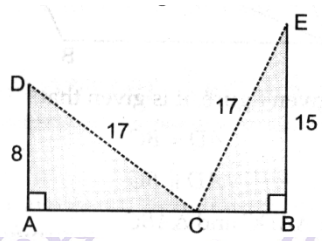
OA + OB + OB + OC + OA + OC > AB + BC+ CA

$\Rightarrow$ 2 OA + 2OB + 2OC > AB + BC+CA

$\Rightarrow$ 2 (OA + OB + OC) > AB + BC + CA.

2. A ladder 17m long reaches a window which is 8m above the ground on one side of street. Keeping its foot at the same point, the ladder is turned to the other side of the street to reach a window at a height of 15 m. Find the width of street.

Let AB is the street and C be the foot of ladder. Let D and E be windows at heights of 8m and 15m respectively from the ground.



Then CD and CE are the positions of ladder . From the right angle Δ DAC, By Pythagoras Theorem, $CD^2 = AC^2 + AD^2$

$\Rightarrow$ $AC^2 = CD^2 - AD^2$

$= 17^2 - 8^2$

= 289 – 64

= 225

$\Longrightarrow$ AC = $\sqrt{225}$ = 15.

Again from right Δ EBC, by Pythagoras Theorem

$CE^2 = BC^2 + BE^2$

$BC^2 = CE^2 - BE^2$

= 17 – 15

= 289 – 225

= 64

$\Longrightarrow$ BC = $\sqrt{64}$

= 8m

∴ Width of street,

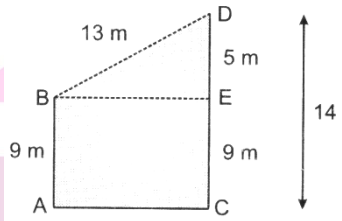
AB= AC + BC

= 15 +8 = 23 m.

3. Two poles of height 9m and 14m stand upright on a plane ground. If the distance between their tops is 13m, find the distance between their feets.

In the above figure, AB and CD are two poles whose heights are 9m and 14m respectively.

$\Longrightarrow$ AB= EC = 9m



And BD = 13 m

DE = 14 -9 = 5m

Now in right Δ BDE , by Pythagoras

$BD^2 = BE^2 + DE^2$

$13^2 = BE^2 + 5^2$

$\Longrightarrow BE^2 = (13)^2 - (5)^2$

= 169 – 25.

BC^2 = 144.

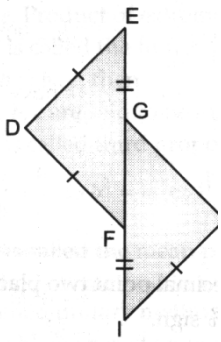
$\Longrightarrow$ BE = $\sqrt{144}$

$\Longrightarrow$ = 12 m.

Hence distance between their feet = 12m.

3. In figure DE = IH, EG = FI and ∠ E= ∠I, Is Δ DEF ≅ HIG?

If yes, by which congruence criterion?



Given EG =FI

Adding GF on both sides, we get

∴ EG + GF = GF+FI

⟹ EF = GI

In _____(!) (from figure)

In Δ DEF and Δ HIG DE = IH (given)

∠DEF= ∠HIG = (given)

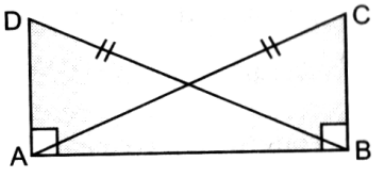
and EF = GI (From 1)

Here, we see that, if two sides and the angle included between them of a triangle are equal to two corresponding sides and the angle included them of other triangle, then the triangles are congruent by SAS congruence rule

Hence In Δ DEF ≅ Δ HIG .

II. Long Answer Questions

1. In the given figure DA ⊥ AB, CB ⊥ AB and AC =BD



State the three pairs of equal parts in Δ ABC and Δ DA

Which of the following statement is meaningful?

i) . Δ ABC ≅ Δ BAD

2. Δ ABC ≅ Δ ABC

The three pairs of equal parts are :

$\angle ABC$ = ∠ BAD = 90^o

AC = BD [given)

AB = BA [COMMON SIDE]

From the above, . Δ ABC ≅ Δ BAD (By RHS congruence rule)

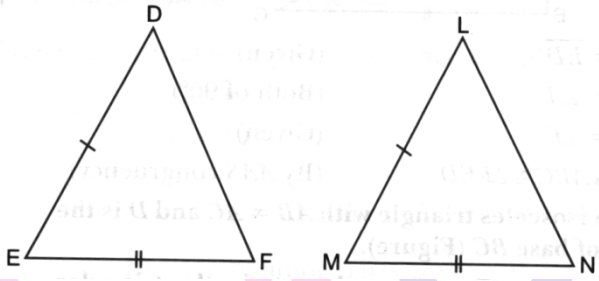
So, statement (i) is true.

Statement (ii) is not meaningful, in the sense that the correspondence among the vertices is not satisfied.

2. Triangles DEF and LMN are both isosceles with DE = DF and LM = LN. Respectively. If DE=LM and EF = MN, then are the two triangles congruent?

If $\angle E = 40^0$ what is the measure of $\angle N$?

Yes, both the Δ's can be congruent if



i) $\angle E = \angle M$ $(By\ SAS\ congruent)$

or (ii) DF = LN (By SSS congruency)

Now in Δ LMN $\angle M = 40^0$ (By (i)

And $\because \angle M = \angle N$

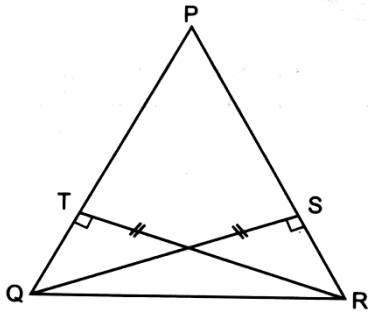
$\therefore \angle M = \angle N = 40^0$ (Equal sides have equal opposite angle)

Hence measure of $\angle N = 40^0$

3. IN the given figure QS $\perp$ PR, RT $\perp$ PQ and QS = RT.

i) Is Δ QSR = ΔRTQ? Give reasons,

ii) Is $\angle$PQR = $\angle$PRQ? Give reasons



i) Yes because,

QS = RT (Given)

QR = QR (common)

$\angle T = \angle S$ (Both of 90^0)

$\therefore \Delta$ QSR = ΔRTQ (BY RHS congruency)

ii) Yes, By CPCT.